

The Institute for Sensing and Embedded Network Systems Engineering

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Energy Harvested Security for the Internet of Things

The Internet of Things (IoT) is projected to connect 50 billion devices by 2020. This massive amount of connected electronics will need innovative means of powering, and for small embedded devices, this implies the use of energy harvesting. In this talk, we explore the tension between the solid information security required for Internet connectivity on the one hand, and the energy-starved operating environment of embedded connected devices on the other. An energy harvester provides only minute amounts of power, but in principle unbounded energy. Hence, the key to efficient operation in an energy harvesting context is to properly schedule and balance energy harvesting with energy consumption.

We start by quantifying the energy needs of common operations in Secure Internet applications, highlighting recent technological developments in low energy cryptography. Then, we seize on the opportunity of energy harvesting by developing techniques to spread out computations over time. We reformulate cryptographic algorithms as capable of generating coupons, which are precomputed portions of the algorithm. Coupons are generated when there is sufficient energy, and they can be used to speed up online computations at a later phase. We propose techniques for coupon generation and their tamper-proof storage. We illustrate this concept on several common cryptographic kernels. We conclude with an outlook towards the opportunities for a truly energy-efficient secure IoT.

Speaker

Dr. Schaumont's research interests are in design and design methods of secure, efficient and real-time embedded computing systems. He received the Ph.D. degree in Electrical Engineering from UCLA in 2004 and the MS degree in Computer Science from Ghent University in 1990. From 1992 to 2000 he was a staff researcher at IMEC, Belgium. From 2001 until 2005 he was a graduate-level and post-doctoral researcher at UCLA. He joined Virginia Tech in 2005. From 2012 to 2014 he served as Director of the Center for Embedded Systems for Critical Applications (CESCA) at Virginia Tech. In 2014 he was a visiting researcher at the National Institute of Information and Telecommunications Technology (NICT) in Japan. He was named Outstanding New Assistant Professor in 2007, received the Dean's Award for Excellence in Teaching in 2012, and was named Dean's Faculty Fellow in 2013. He served as program co-chair for several conferences in cryptographic and secure engineering, including CHES, HOST, WESS, and RFIDsec. He received the National Science Foundation CAREER Award in 2007.



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11:00 a.m. – 12:00 p.m.
FAU Engineering East
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